

## Relationship of knowledge and attitude toward the practice of oral health among expectant mothers

*Hubungan Pengetahuan dan Sikap terhadap Praktik Kesehatan Rongga Mulut pada Ibu Hamil*

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### ABSTRACT

**Background:** Oral health during pregnancy is a critical component of maternal and fetal well-being; however, it is often overlooked due to a lack of knowledge and attitude to maintain the wellness of oral health wellness among expectant mothers.

**Objective:** to assess the relationship between knowledge and attitude with oral health care practices among pregnant women in Made Community Health Centre, Surabaya

**Methods:** A descriptive cross-sectional study involving 300 pregnant women selected through purposive sampling. Data were collected using a validated structured questionnaire, and Spearman's rank correlation analysis was applied to evaluate the relationships between variables.

**Results:** The majority of participants fell within the 26–35 age bracket (50%) and were in their third trimester (53%). The statistical analysis revealed a significant positive correlation between knowledge and oral health practice ( $r_s = 0.382$ ;  $p < 0.001$ ). Furthermore, a moderate and significant correlation was found between attitude and practice ( $r_s = 0.445$ ;  $p < 0.001$ ). While the participants demonstrated generally adequate knowledge and positive attitudes, specific preventive practices—such as the use of dental floss and regular dental visits—remained suboptimal. The findings confirm that both knowledge and attitude are significant determinants of oral health behaviours, with attitude showing a slightly stronger association with practice.

**Conclusion:** To bridge the gap between knowing and doing, continuous oral health education integrated into antenatal care services is essential. Strategies should focus on fostering positive attitudes to encourage consistent oral hygiene practices among expectant mothers.

**Keywords:** attitude, knowledge, practice, pregnancy

### ABSTRAK

**Latar Belakang:** Kesehatan mulut selama kehamilan merupakan komponen penting bagi kesejahteraan ibu dan janin, namun sering kali terabaikan karena kurangnya pengetahuan dan kesadaran akan pentingnya menjaga kesehatan mulut

**Tujuan:** untuk mengkaji hubungan antara pengetahuan dan sikap dengan praktik perawatan kesehatan mulut di kalangan ibu hamil di Puskesmas Made, Surabaya

**Metode:** Penelitian cross-sectional deskriptif yang melibatkan 300 ibu hamil yang dipilih melalui pengambilan sampel purposif. Data dikumpulkan menggunakan kuesioner terstruktur yang telah tervalidasi, dan analisis korelasi peringkat Spearman digunakan untuk mengevaluasi hubungan antar variabel.

**Hasil:** Sebagian besar responden berusia 26–35 tahun (50%) dan sedang berada pada trimester ketiga kehamilan (53%). Analisis statistik menunjukkan adanya korelasi positif yang signifikan antara pengetahuan dan praktik kesehatan mulut ( $r_s = 0,382$ ;  $p < 0,001$ ). Selain itu, ditemukan korelasi moderat dan signifikan antara sikap dan praktik ( $r_s = 0,445$ ;  $p < 0,001$ ). Meskipun secara umum responden menunjukkan pengetahuan yang memadai dan sikap positif, praktik pencegahan tertentu—seperti penggunaan benang

gigi dan kunjungan rutin ke dokter gigi—masih belum optimal. Temuan ini menegaskan bahwa baik pengetahuan maupun sikap merupakan penentu signifikan terhadap perilaku kesehatan mulut, dengan keterkaitan yang sedikit lebih kuat antara sikap dan praktik

**Kesimpulan:** Untuk mengurangi kesenjangan antara pengetahuan dan tindakan, pendidikan kesehatan gigi dan mulut yang berkelanjutan dan terintegrasi ke dalam layanan perawatan antenatal sangatlah penting. Strategi yang diterapkan harus berfokus pada pembentukan sikap positif guna mendorong praktik kesehatan gigi dan mulut yang konsisten di kalangan ibu hamil

**Kata kunci:** sikap, pengetahuan, praktik, kehamilan

## INTRODUCTION

As posited by the World Health Organization (WHO), the maintenance of oral health is a fundamental element of both comprehensive healthcare and general well-being.<sup>1</sup> Pregnancy represents a unique psychological period characterized by multifaceted hormonal shifts, specifically the elevation of estrogen and progesterone which can significantly compromise oral tissues.<sup>2,3</sup> The prevalence of gingivitis and periodontitis among pregnant women has been documented to vary between 36% and 100%.<sup>4</sup> It is a well-documented fact that pregnancy is frequently accompanied by a range of ailments, including morning sickness and dental erosion.<sup>5</sup> Furthermore, it has been reported that pregnancy is associated with an increased risk of caries.<sup>6</sup> In addition to alterations in hormone levels, nutritional intake and dental health are recognized as significant contributors to the development of oral diseases.<sup>7</sup>

A considerable number of research studies have demonstrated a correlation between poor maternal oral health and suboptimal birth outcomes.<sup>8</sup> As demonstrated in the extant literature, the transmission of cariogenic bacteria through improper feeding by mothers suffering from inadequate oral health has been shown to have the potential to increase the caries risk of their offspring. Several studies have demonstrated a correlation between the state of the mother's periodontal health and the outcome of the pregnancy. It has been demonstrated that periodontal disease has the potential to result in low birth weight (LBW) and the occurrence of premature birth.<sup>9,10</sup>

While the link between maternal periodontal disease and adverse birth outcomes is well-established, a significant disconnect persists between clinical knowledge and patient behavior. Globally, Knowledge-Attitude-Practice (KAP) studies have explored these dynamics; however, a critical research gap remains in understanding how these factors interact within the specific framework of the Indonesian primary healthcare system (Puskesmas). Maintaining optimal oral health during pregnancy is a crucial aspect of healthcare that should be emphasised. This involves a multifaceted approach encompassing knowledge, attitude, and practice.<sup>11</sup>

Puskesmas are primary healthcare facilities prioritising preventive and wellness initiatives.<sup>12</sup> Made Community Health Centre's promotional efforts for pregnant women include several programmes, such as the Integrated Health Service (Posyandu) and ante-natal care (ANC). In Indonesia, the Puskesmas serves as the frontline for Posyandu and ANC. Despite these existing promotional programs, recent data from Surabaya indicates a dramatic surge in dental caries cases, skyrocketing from 4.31% in 2018 to 33.58% in 2019. The percentage of dental and oral cases in 2017 was 8.58% with a total of 246,603 cases, and in 2018, dental and oral cases decreased to 124,511 cases with a percentage of 4.31%. Cases have increased dramatically in 2019 to 972,630 cases, with a percentage of 33.58%.<sup>13</sup>

This research seeks to fill the gap by investigating why high accessibility to primary care does not translate into effective oral hygiene practices. Unlike broader studies, this investigation evaluates the specific influence of socio-economic factors and local perceptions—such as the pervasive myth that dental procedures harm the fetus—within the Surabaya community context. By identifying these specific barriers, this study aims to provide actionable insights for optimizing the integration of oral health into standardized Indonesian ANC protocols, thereby reducing the risk of vertical infection transmission from mother to offspring.

## **METHODS**

### **Study design**

This research employed a descriptive study approach with a cross-sectional design. Conducted at the Puskesmas Made at Surabaya on October 2025.

### **Data source and sampling procedure**

Data sources for this research is primary; the inclusion criteria of subjects were pregnant women visiting Puskesmas Made, confirmed to be pregnant, aged between 21 and 35 years old, and resided within the working area of the Puskesmas Made, while the exclusion criteria were those pregnant women who declined to participate in this research. Purposive sampling was used to select participants who met the stipulated criteria, with the initial calculation formula requiring at least 150 individuals; the study successfully recruited 300 respondents.

### **Variables of the study**

Independent Variables: The primary independent variables are the participants' knowledge and attitudes toward oral health care. Dependent Variable: oral health care practice exhibited by the pregnant women. Other Relevant Variables (Sociodemographic): These include identifying factors such as age, the highest level of education and the specific trimester of pregnancy.

### **Data collection**

The data collection process was initiated by providing all respondents with comprehensive research information to ensure they understood the study's scope. Pregnant women who expressed a willingness to participate then proceeded to sign an informed consent form. The researchers administered a structured questionnaire consisting of four distinct sections, which captured sociodemographic data, oral health knowledge, attitudes, and actual practices. Once the predetermined questionnaires were completed by the 300 subjects, the findings were systematically analyzed and compiled into tables for further evaluation.

### **Measurement and instruments**

Measurement of study variables was conducted using a structured questionnaire adapted from Mutiara et al. (2021), which was previously validated and tested for reliability.<sup>8</sup> Knowledge was assessed through 10 multiple-choice items using a Guttman scale, where correct responses received a score of 1 and incorrect ones a 0. Attitudes were evaluated via 11 queries on a Likert scale, assigning 2 points for 'agree' and 1 for 'disagree', while oral health practices were measured using 10 affirmations on a Guttman scale (1 for 'yes', 0 for 'no'). These instruments specifically addressed parameters such as toothbrushing frequency, fluoride use, dental visit importance, and nutritional impact, aligned with the WHO Oral Health Surveys Method. Each variable was ultimately categorized into three levels: 'Good' for scores exceeding 75%, 'Adequate/Fair' for scores between 60% and 75%, and 'Less' for scores falling below 60%.

### **Ethical considerations**

Ethical considerations for this study were strictly maintained by securing formal ethical clearance from the Universitas Ciputra Health Research Ethics Committee under

registration number 280/EC/KEPK-FKUC/X/2025. Prior to their participation, all respondents were provided with pertinent research information to ensure a full understanding of the study's objectives. Subjects who expressed a willingness to partake were required to sign an informed consent form before proceeding to complete the predetermined questionnaires.

**Data analysis**

Statistical evaluation was conducted by compiling all quantitative data into tables for systematic analysis. To determine the strength and significance of the relationships between variables, the Spearman correlation test was employed, specifically assessing the interrelationships among knowledge, attitude, and practice parameters. This bivariate approach is scientifically justified because the primary objective of the investigation was to evaluate the direct, pairwise relationship between two specific constructs: how a mother's knowledge or attitude independently correlates with her oral health practices. Since the data for knowledge and practice were measured using ordinal categories or non-normally distributed scales (Guttman and Likert), the Spearman rank correlation—a non-parametric bivariate test—is the most robust method for detecting monotonic relationships without assuming a linear distribution. Following standard statistical conventions, variables were deemed to be significantly associated if the resulting p-value was less than 0.05. This analytical approach aimed to ascertain how pregnant women's knowledge and attitudes directly correlate with their oral health care outcomes.

**RESULTS**

As illustrated in Table 1, the majority of the participants fell within the 26-35 age bracket (150 respondents, constituting 50%), while the smallest proportion was observed in the 36-45 age group (20 respondents, representing 7%). The majority of participants had received a tertiary education (140 respondents, 47%), while only 70 participants (23%) had completed primary education. The data reveal that, in terms of the trimester of pregnancy, only ten respondent (3%) was in the first trimester. The majority of participants (160 participants, 53%) were in the third trimester.

**Table 1. Participant's Demographic**

Variable		n	%
Age	16-25	130	43
	26-35	150	50
	36-45	20	7
	Total	300	100
Education	Primary (SD/SMP)	70	23
	Secondary (SMA/SMK)	90	30
	Tertiary (D3/S1/S2/Spesialis/S3)	140	47
	Total	300	100
Pregnancy Trimester	1	10	3
	2	130	43
	3	160	53
	Total	300	100

In Table 2, the responses given by the participants in the survey are presented in relation to their levels of knowledge concerning oral health care. The four inquiries that elicited the most responses were identified as questions 5 and 8, with 300 respondents providing a 100% response rate. The lowest-scoring item was question number 2, which was endorsed correctly by only 160 participants (53%).

**Table 2. Participant's Answer on Oral Health Care Knowledge**

No.	Statement	Answer			
		True		False	
		n	%	n	%
1	It is imperative to brush teeth at least twice a day	250	83	50	17
2	The optimal timing for morning tooth-brushing is subsequent to breakfast	160	53	140	47
3	It is imperative to brush one's teeth in the evening, ideally before going to bed.	280	93	20	7
4	Dental floss and a tongue blade constitute oral hygiene aids	290	97	10	3
5	The objective of the tongue scraper is to ensure the removal of surface debris from the tongue	300	100	0	0
6	A satisfactory tooth-paste should contain fluoride	250	83	50	17
7	Dental examinations are to be performed at intervals of six months	250	83	50	17
8	The objective of these procedures is twofold, being both the prevention of further dental problems and the early diagnosis of any anomalies	300	100	0	0
9	A diet that is conducive to optimal oral well-being should comprise foods that are rich in essential nutrients such as vitamins A, C, and D, calcium, and fluoride	290	97	10	3
10	It is recommended that expectant mothers who have vomited promptly rinse or cleanse their mouths	270	90	30	10

As illustrated in Table 3, the responses to the questionnaire pertaining to the respondents' attitudes towards oral healthcare are presented. Six statements were identified as having received the most substantial agreement among respondents, with all participants (100.0%) expressing concurrence with these statements. The least supported statement was "It is evident that oral health issues experienced by pregnant women have the potential to adversely impact the health of their infants", with 260 participants (87%) expressing disagreement.

**Table 3. Participant's Answer on Oral Health Care Attitude**

No.	Statement	Answer			
		True		False	
		n	%	n	%
1	It is evident that oral health issues experienced by pregnant women have the potential to adversely impact the health of their infants	260	87	40	13
2	The recommended routine for optimal oral hygiene involves two tooth-brushing sessions per day	300	100	0	0
3	The optimal moment for the performance of the morning toothbrushing routine is subsequent to breakfast	270	90	30	10
4	It is recommended that dental hygiene routines be performed in the preceding evening, prior to the commencement of sleep	300	100	0	0
5	The utilisation of dental floss as an implement for oral health maintenance should be given due consideration	300	100	0	0
6	It is imperative to utilise a tongue scraper in order to ensure optimal oral hygiene by effectively removing bacteria from the tongue's surface	300	100	0	0
7	It is widely accepted that a high-quality toothpaste	290	97	10	3

No.	Statement	Answer			
		True		False	
		n	%	n	%
	should contain fluoride				
8	It is vital that pregnant women undergo regular oral health examinations	290	97	10	3
9	It has been demonstrated that the dietary composition of expectant mothers has a direct impact on the development of their offspring's dentition	300	100	0	0
10	Nutritious diets comprising a wide variety of foodstuffs have been demonstrated to be efficacious in the maintenance of optimal oral health	300	100	0	0
11	The ingestion of sugary foods has been proven to result in the development of decay in teeth	280	93	20	0

Results pertaining to the responses given by participants in response to the oral health care practice questionnaire are presented in Table 4. In the present study, the data collected revealed that a total of 300 participants (100%) reported performing oral hygiene routines involving toothbrushing at least twice daily, prior to bedtime, and the utilisation of a toothpaste containing fluoride. Despite universal brushing, respondents might skipping professional check-ups remain at high risk for pregnancy gingivitis, acid erosion and adverse birth outcomes, as manual clearing cannot address the complex hormonal impacts and calculus buildup that professional intervention manages. It is noteworthy that these three assertions were the foremost among the respondents' responses. The least prevalent oral healthcare practice among the participants was undergoing a dental exam biannually, a practice that a considerable proportion of the respondents did not engage in, with a total of 190 participants (63%) not having undergone such an examination.

**Table 4. Participant's Answer on Oral Health Care Practice**

No.	Statement	Answer			
		True		False	
		n	%	n	%
1	Brushing teeth twice a day	300	100	0	0
2	Brushing teeth after breakfast in the morning	220	73	80	27
3	Brushing teeth before going to bed	300	100	0	0
4	Utilizing of dental floss	200	67	100	33
5	Utilizing of tongue scrapper	220	73	80	27
6	Utilizing of tooth-paste containing fluoride	300	100	0	0
7	Getting a dental check-up twice a year	190	63	110	37
8	Maintain a nutritious diet while pregnant	300	100	0	0
9	Limit intake of sweet foods	270	90	30	10
10	Mouth gargling after vomiting	290	97	10	3

As illustrated in Table 5, 100 participants (33%) demonstrated a satisfactory level of oral health care knowledge, while only fifty participants (17%) exhibited an inadequate level of knowledge. 130 participants (43%) exhibited a favourable attitude towards oral health care, with no participants demonstrating an unfavourable attitude. With regard to oral health care practice, 120 participants (40%) exhibited good practice, while 30 participants (10%) exhibited poor practice.

As demonstrated in Table 6, the study's findings with the expanded sample size (N=300) reveal a highly statistically significant correlation between knowledge and oral health practices ( $r_s = 0.382$ ;  $p < 0.001$ ). Although the strength of the correlation remains

in the weak-to-moderate range, the increased sample size confirms that this relationship is not due to chance. Furthermore, the investigation into the relationship between attitudes and practices revealed a moderate and highly significant correlation ( $r_s = 0.445$ ;  $p < 0.001$ ).

**Table 5. Participant’s Knowledge, Attitude, and Practice Items**

Variables		n	Percentage (%)
Knowledge	Good	100	33
	Adequate	150	50
	Poor	50	17
	Total	300	100
Attitude	Good	130	43
	Adequate	170	57
	Poor	0	0
	Total	300	100
Practice	Good	120	40
	Adequate	150	50
	Poor	30	10
	Total	300	100

**Table 6. Spearman’s Correlation Test between Knowledge, Attitude, and Practice of Oral Health Care**

		$r_s$	$p$ -value
Knowledge	Practice	0,382	0,000*
Attitude	Practice	0,445	0,000*

**DISCUSSION**

**Consistency of Knowledge, Attitude and Practice**

The study reveals a distinct "knowledge-practice gap" among pregnant women at the Puskesmas Made. While a significant portion of participants demonstrated satisfactory oral health literacy (33%) and near-universal compliance with basic daily hygiene—such as brushing twice daily with fluoride toothpaste (100%)—these high levels of awareness did not translate into professional care utilization. Specifically, 63% of respondents failed to attend biannual dental examinations, indicating that maternal oral health practices in this population are largely limited to personal routines rather than integrated clinical prevention. This findings align with global trends suggesting that while pregnant women understand the general concept of cleanliness, they often lack the "procedural knowledge" or confidence required to seek professional dental interventions during gestation.<sup>14</sup>

Scientifically, the stronger correlation found between attitude and practice ( $r_s = 0.445$ ;  $p < 0.001$ ) compared to knowledge and practice ( $r_s = 0.382$ ;  $p < 0.001$ ) suggests that a mother’s belief system is a more significant predictor of her behavior than theoretical information alone. According to the Health Belief Model, behavioral change is driven by "perceived threat" and "perceived benefit".<sup>15</sup> In this study, the significant discrepancy between the 87% of respondents who acknowledge the impact of oral health on fetal well-being and the suboptimal attendance in professional check-ups highlights a substantial knowledge-practice gap, indicating that high theoretical awareness does not translate into clinical action. This paradox suggests that while educational efforts have successfully instilled a positive attitude, significant barriers—such as the lack of a mandatory referral system within Integrated ANC, physical discomfort during the third trimester, and a tendency to delay care in the absence of acute pain—prevent pregnant women from acting on their knowledge. Consequently, this inconsistency underscores the pressing need to transition from passive education to institutional policy, thereby

ensuring that dental screenings become an integral and automatic component of maternal healthcare, thus addressing the prevailing disparity between theoretical affirmation and practical implementation.<sup>16</sup>

Furthermore, the consistency of these variables is heavily influenced by the specific context of the Indonesian primary healthcare system (*Puskesmas*). Although the majority of participants were in their third trimester and enrolled in the Integrated Ante-Natal Care (ANC) program, the translation of knowledge into professional practice remains suboptimal. This suggests that while the promotional efforts at the *Puskesmas* Made have successfully raised literacy, they have not yet overcome deep-seated socio-cultural myths or psychological barriers, such as misconceptions about the safety of dental procedures during pregnancy. For oral health practices to become truly consistent with knowledge, clinical education within the ANC framework must transition from general literacy to targeted behavioral interventions that emphasize the safety, necessity, and direct neonatal benefits of professional dental care.

### Scientific Justification for Variable Influence

A salient finding of this study is that attitude serves as a more powerful predictor of practice than knowledge alone ( $r_s = 0.445$  vs  $0.382$ ). Scientifically, this is explained by the Health Belief Model, where "perceived susceptibility" and "perceived severity" drive behavior.<sup>17</sup> Even when women *know* dental health is important (knowledge), they may not *act* unless they *believe* that poor oral health poses a direct threat to their pregnancy (attitude). The high percentage (87%) of women who did not believe their dental health affects their infants explains the moderate, rather than strong, correlation—the "perceived threat" is currently missing from their belief system. Scientific literature supports this, indicating that while knowledge provides the necessary foundation for awareness, it is the subjective value—the attitude—that bridges the gap between understanding a health requirement and the actual implementation of consistent hygiene behaviors.<sup>18</sup>

### Socioeconomic and Scientific Barriers

Beyond psychological factors, several external variables influence the translation of oral health knowledge into practice within the Indonesian primary care context:

- **Economic Constraints and Resource Allocation:** While basic ANC services at the *Puskesmas* are often subsidized or covered by national insurance (JKN), the perceived or actual cost of advanced dental treatments remains a significant deterrent. Utilization of professional dental services is closely tied to household income, as pregnant women from higher-income households tend to seek dental care more frequently than those from lower-income backgrounds.<sup>19</sup>
- **Access and Systemic Integration within ANC:** Most participants in this study were in their third trimester and enrolled in the *Puskesmas* ANC program. Access barriers that they might have to face generally due to a combination of physical factors (restricted mobility due to increased body weight), accessibility (the long distance from their home to *Puskesmas*), and psychological factors (perceiving their pregnancy to be problem-free, leading to reluctance to attend check-ups). Furthermore, it is quite difficult for them to reach *Puskesmas* as they live in areas that are kilometres away, as a result they might be reluctant to have dental check-ups.<sup>20</sup>
- **Cultural Norms and Social Support Systems:** A critical barrier identified in this research is the pervasive sociocultural myth regarding the safety of dental procedures, with 87% of respondents unaware of the risks poor oral health poses to their infants. In many Indonesian communities, the advice of elders or social networks often outweighs clinical recommendations, leading to the perpetuation of misguided assumptions that dental interventions may harm the fetus.<sup>21</sup>
- **Provider-Patient Communication and Health Literacy:** The effectiveness of the *Puskesmas* dental program is frequently limited by the quality of communication

between healthcare providers and patients. While mothers may possess basic literacy (47% tertiary education), a lack of "procedural health literacy"—knowing *how* and *when* to access specific dental treatments—persists because oral health education is often delivered as general information rather than personalized clinical guidance during ANC sessions.<sup>22</sup>

### Practical and Policy Implications

Healthcare professionals at Puskesmas must shift from providing "general information" to "targeted behavioral education".<sup>23,24</sup> On the policy level, the Indonesian Ministry of Health has developed an ANC programme known as '10 T' for every ANC visit. In the current ANC guidelines, dental examinations are included but their status is often still listed as 'internal referral if necessary' rather than a mandatory procedure. Therefore, author proposed that dental examination during ANC visit become 'mandatory non-negotiable component' with the aim of raising the status of dental examinations to be on equal level with blood pressure or blood test. should consider making dental screening a mandatory, non-negotiable component of the Integrated ANC.

### CONCLUSION

This study confirms a significant positive correlation between knowledge, attitudes, and oral health practices among pregnant women in Surabaya. Pregnant women must be educated to dispel myths regarding the safety of prenatal dental care, while system integration should mandate automatic referrals from midwives to dental unit during routine ANC in visit to Puskesmas to ensure comprehensive maternal health.

### ACKNOWLEDGMENTS

The authors extend their profound appreciation to Puskesmas Made Surabaya for its consent to procure maternal data and for its invaluable recommendations and constructive appraisals, which have significantly enhanced the quality of this research study.

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